Vol. 11 DECEMBER, 1946 No. 12

CORNELL-DUBILIER ELECTRIC CORP.
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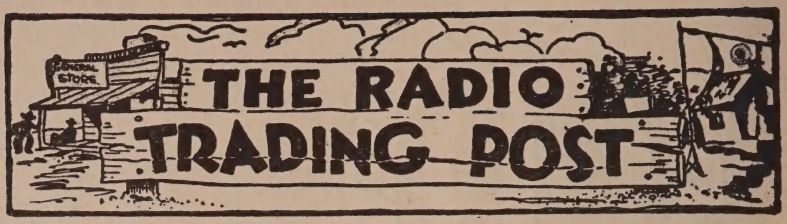


A Free Market-Place for Buyers, Sellers, and Swappers.

These advertisements are listed FREE of charge to C-D readers so if there is anything you would like to buy or sell, if you wish to obtain a position or if you have a position to offer to C-D readers, just send in your ad.

These columns are open only to those who have a legitimate, WANTED, SELL or SWAP proposition to offer. The Cornell-Dubilier Electric Corp. reserves the right to edit advertisements submitted, and to refuse to run any which may be considered unsuitable. We shall endeavor to restrict the ads to legitimate offers but cannot assume any responsibility for the transaction involved.

Please limit your ad to a maximum of 40 words, including name and address. Advertisements will be run as promptly as space limitations permit.

SELL OR SWAP—Radio service business, in rural community same location 20 years. About 20 towns to draw business from, dry battery jobber contract. No competition. Near famous Lake Nimrod. United Purchasers, 262, Danville, Ark.

WANTED FOR RESALE—Several ac motors, one quarter, one third, one half h.p.. in good condition. Answer all letters or cards. Oakhurst Radio Repair, Elma, Wash.

FOR SALE—Radio receiving tubes in cartons at 40% discount from list price. Higher discounts in quantities of 100 or more. Also have transmitting and special purpose tubes at low prices. Write stating needs. Murray Fisher, 1986 Grand Ave., New York, N. Y.

FOR SALE—RME DB20 preselector, $35. Stancor models and Hallicrafters model transmitters. National and Hallicrafters receivers. National NTE-B exciter-speech amplifier. Hewlett Packard 200B audio oscillator. All in good condition and reasonably priced. Write for description. Sidney Wald, 1100 Magee Ave., Philadelphia 11, Pa.

FOR SALE—Autographic Graflex roll film. 7" Goerz Dagmar F4.5 lens with carrying case and Kodak daylight developing box and tank, $100. Send money order. Will send express collect. H. Leeds, 15 W. 15th St., Ocean City, N. J.

TRADE—Rifle telescope, 12 gauge full choke single, gun parts, bicycle brakes, reels, exposure meter, etc. Want good test oscillator, 8 mm projector, small radios, any condition. W. J. Closson, 295 8th St., Troy, N. Y.

FOR SALE—Assortments of the following for $42 pp. 5 1A5GT, 5 1A7GT, 10 1H5GT, 10 1N5GT. All in new cartons. No C.O.D. Also have practically new S-41 receiver for $33 or trade for what have you. Edward Howell, Dillon, S. C.

FOR SALE OR TRADE—New Royal Deluxe portable typewriter in original packing. Interested in obtaining photographic equipment. Dexter Kurs, 4525 45 St., Long Island City 4, N. Y.

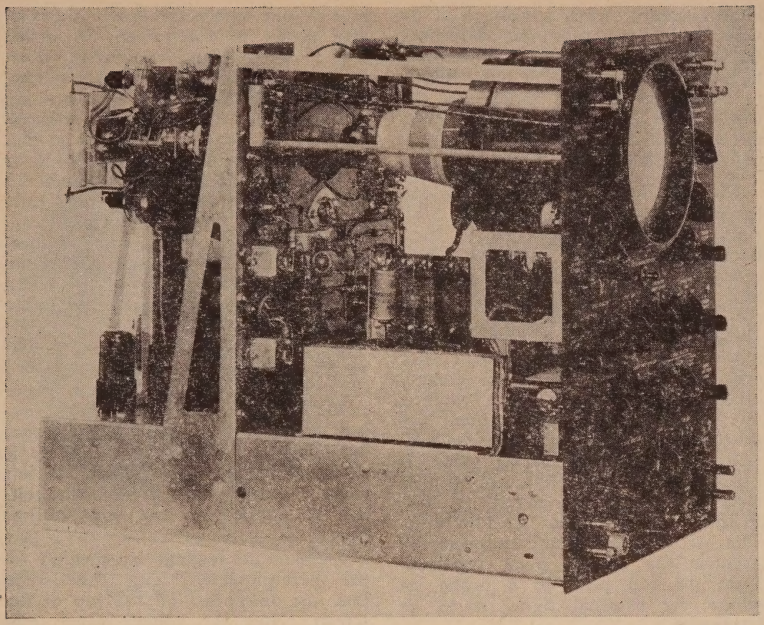
FOR SALE—U.T.C. and Thordarson high fidelity transformers, 55% off list price. High voltage power transformer and filter chokes same discount. All items new. Radio Communication Service, 4475 Myrtle St., San Diego 5, Calif.

WILL TRADE—Phono motor and Shure Pickup mounted in small Elwood cloth case, ac phono amplifier in case with motor and tone arm. Readrite 739 V.O.M. 1940 Pontiac car radio. All items in class A1 shape. Need good V.T. Vim, RCA Jr., or electronic designs and also a signal generator and tube tester. Gene Zar, RFD Rt. 1, Frankfort, Ill.

WANTED—6 prone coils, broadcast band 185-360 meters and 350-565 meters. Send prices and details to Ken Glanzer, Box 307, Bridgewater, S. D.

FOR SALE—One SCR-211 famous army freq. meter, with crystal and two spare tubes. It will go to first reasonable offer. Guaranteed perfect shape. Will also swap for what have you. Jackson Radio Service, 412 Arbutus Ave., Manistique, Mich.

(Continued on page 11)



Courtesy Allen B. DuMont Laboratories

THE OSCILLOGRAPH - - - how to use it*

One of the simplest yet most useful functions in which the cathode-ray oscilioscope excels is its use as a voltmeter. Of course its accuracy is not so great as that of the very sensitive instruments specifically designed for that purpose. It has the following great advantages over conventional voltmeters:

1. It has extremely high input impedance;
2. It enables the operator to view the voltage wave under examination while he is measuring it;
3. Every point of a complex voltage wave-form can be examined and measured individually.

It has the disadvantage that it does not have the extreme range capabilities of some voltmeters. With some auxiliary apparatus, described later on, even this disadvantage can be overcome.

Of course, it is not very economical to buy a cathode-ray oscilloscope merely to use it as a voltmeter alone, but when an oscilloscope is used as a general testing instrument its use as a voltmeter will be found of great value.

Set-up

For cathode-ray oscilloscopes which have a deflection factor in the order of 25, a DC voltage of 25 volts applied directly to the deflecting plates will deflect the spot or trace one inch above or below its zero voltage position. Since the operation of the oscilloscope is

** By Karl R. Alberts in "Radio Maintenance" magazine.*

approximately linear, a voltage of 50 volts will cause a 2-inch deflection, 62.5 volts will cause a 2½-inch deflection, and so on. For convenience in later testing, the screen of the oscilloscope should be calibrated in terms of voltage applied to the vertical deflecting plates.

Connect the oscilloscope in the following manner: Right and left horizontal deflecting plates tied to their horizontal amplifier terminals, bottom vertical plate grounded, top vertical plate connected to external signal. For oscilloscopes which, like the DuMont 208, have a rear terminal block, connect as shown in Fig. 1. For other oscilloscopes where no terminal block is provided, usually two switches, one for the horizontal channel, the other for the vertical channel, are provided with positions marked AMPLIFIER and EXTERNAL, or similar markings; switch horizontal to AMPLIFIER, vertical to EXTERNAL. The latter operation automatically grounds the bottom plate and connects the top plate to a probe on which the external signal is to be impressed.

Connect D4 (top plate) to ground temporarily. Turn on the oscilloscope, switch sweep frequency to some arbitrary value (say 1000 cycles per second), adjust FOCUS and INTENSITY controls so a clear, sharp line is obtained. Adjust horizontal gain for a line about 3 inches wide. The line should be somewhere in the vertical center of the screen. Now lift D4 off ground and connect it to an external variable DC voltage source, as in Fig. 1. (It might seem strange to have to use a voltmeter in order to calibrate the oscilloscope screen so that the oscilloscope itself may be used as a voltmeter; it must be remembered that the voltmeter is being used only for the initial calibration of the oscilloscope and will not be used thenceforth. Once the oscilloscope has been calibrated, it will be capable of doing many more things than an ordinary voltmeter.)

The voltmeter, incidentally, should have a high impedance compared with the resistance of the potentiometer across the battery, although the shunting effect of the voltmeter's internal resistance across the potentiometer is unimportant if the voltmeter is left connected in the circuit when the voltage is applied to the top vertical plate.

Increase the voltage by turning up the potentiometer, until the sweep line just disappears off the top of the screen. Note the voltage value indicated on the external voltmeter. With this voltage figure in mind, estimate the best voltage increments by which to divide the screen. If, for example, the voltage is about 50 volts, then a total screen deflection (top to bottom) will be produced with about 100 volts; main divisions of 20 volts with sub-divisions of 10 volts will then be most

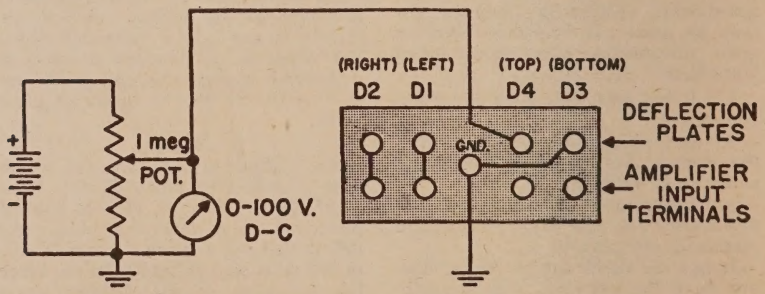


Fig. 1 Connections used when calibrating the oscilloscope. The terminal block shown is that used on the DuMont 208B but the same method can be used with other oscilloscopes.

practical. Fig. 2 shows a screen calibrated in this fashion. Make the markings with a soft red or blue china marking pencil directly on the glass. The screen is now calibrated and ready for use as a DC or AC voltmeter.

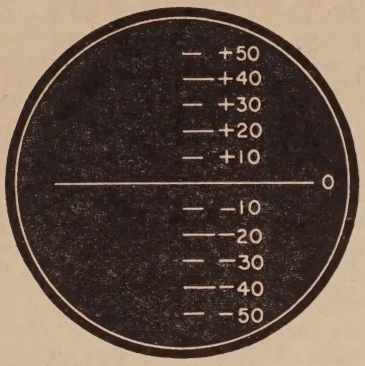


Fig. 2 An Oscilloscope screen calibrated by the method explained in the text. The markings are made with a soft red or blue china marking pencil.

Suppose it is necessary to check the B— and bias voltages in a radio set quickly, in an approximate manner, merely to determine some gross error in the set and without too much regard for precision. Connect the oscilloscope ground to the chassis ground of the radio. Connect the top vertical plate D4 to a probe which can conveniently be hooked to any point to be observed. Then with the probe in hand, move from one DC point to another on the radio chassis, observing the deflections on the oscilloscope screen and checking whether the voltages corresponding to the deflections are correct for the points being observed.

For DC voltages which are greater than full-screen deflection, it will be necessary to build a simple attenuator, such as that shown in Fig. 3. The resistors are made high-valued in order not to constitute much of a shunt on most networks in a radio set. It will prove to be a good idea to construct a small box or chassis consisting of the attenuator shown in Fig. 3, or a similar one, and two plug-and-jack connections for the probe lead, one labeled "direct" and the other "attenuator." The direct lead will connect directly to the top deflecting plate, and can be used on circuits of very high impedance where no shunting resistance can be tolerated.

It must be remembered that the accuracy of a cathode-ray oscilloscope is less than that of most commercial DC voltmeters. For this reason, and also the fact that the range of measurement is limited (even with an attenuator the upper range is limited because the greater the voltage division, the less the accuracy of measurement; and the lower range is limited to a minimum in the order of 2-3 volts), the oscilloscope can only be considered a handy, quick-test voltmeter, not a substitute for a conventional precision meter.

AC Voltages

Where the oscilloscope as a DC voltmeter proved to be inferior to the commercial DC voltmeter except in its convenience (particularly when the oscilloscope is set up for rapid checking and testing of many kinds, with

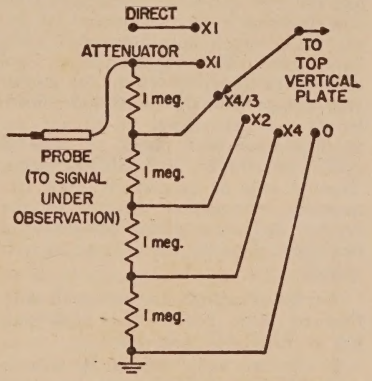


Fig. 3 A simple attenuator used to extend the measuring range of the oscilloscope. The attenuator should be mounted on a small box or chassis.

DC voltage measurements only one of many tests), as an AC voltmeter, the oscilloscope has several points of superiority over the conventional type of AC voltmeter:

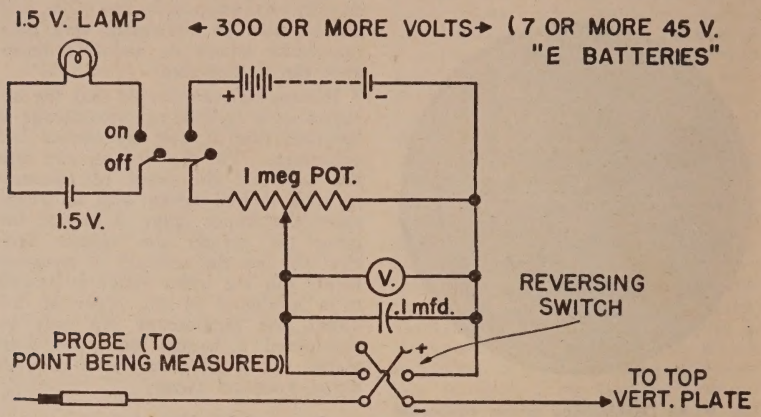


Fig. 4 The above arrangement is used as a calibrator. It is particularly useful when studying complex waveforms.

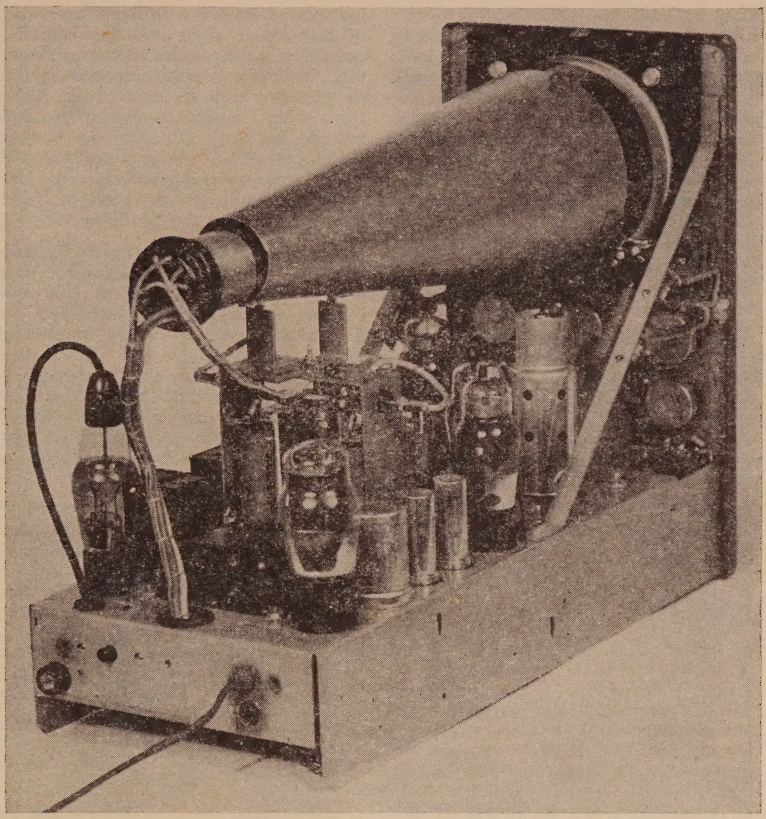
1. It has an extremely high input impedance, when signals are applied directly to the vertical deflecting plates. The plates, being arranged like the two opposing plates of a condenser, have a certain amount of capacitance, which constitutes the input impedance. This capacitance is usually in the order of 10 to 50 micromicrofarads (.00001 to .00005 microfarad). A capacitance of 20 uuf has an impedance of 8 megohms at 1000 cycles; at 100 kc, it is 80,000 ohms. Thus at low or moderately high frequencies, connection directly to the vertical deflecting plates constitutes a negligible loading effect on an AC voltage.

2. Its accuracy compares well with that of most commercial peak-reading or RMS AC voltmeters.

3. It has equal sensitivity over a very wide range of frequencies.

4. It can indicate magnitude of a voltage wave even when it is not a pure sine wave. Every point of a complicated wave-form can be measured, whereas a conventional voltmeter would give a measure either of the peak value or the RMS value of the wave, which for a complex wave would be worthless. (The RMS value of a pure sine wave, it will be remembered, is .707 times the peak value.)

If the voltage to be measured is anywhere in the range of a few volts to several hundred volts, it can be measured by connecting directly to the top vertical plate, just as was done for a DC voltage. The minimum of a few volts is determined by that voltage which can just produce an observable deflection. For an oscilloscope having a deflection factor of 25 volts/inch, one volt would deflect the sweep line by an amount no more than the thickness of the sweep line and hence would not be measurable. Four or five volts could easily be measured. It will be necessary for AC to connect the voltage being measured, or some voltage which varies directly with it, to the EXTERNAL SYNC. terminal on the oscilloscope, and adjust coarse and fine frequency controls and sync amplitude control to obtain a steady



The RCA Model 160 Cathode Ray Oscilloscope. Note the shield covering the Cathode ray tube. The tube with the large cap on top is the high voltage half-wave rectifier.

pattern on the screen. Or, connect nothing to the EXTERNAL SYNC. terminal and use INTERNAL SYNC.

For voltages having values in excess of full-screen deflection value, the attenuator arrangement shown in Fig. 3 can be used.

The calibration marks on the screen of the oscilloscope should be checked from time to time to insure that slight changes in the oscilloscope's deflection factor, which may be due to drifts in anode voltages or any other cause, will be taken into account.

An alternate arrangement for large or small voltages, DC or AC, consists of employing a "continuous calibrator" or "volt box." With this arrangement, only one line need be marked on the screen. Also, voltages considerably in excess of full-scale deflection voltage can be accurately measured without the use of an attenuator. For this method, the circuit of Fig. 4

must be built up. It is really worthwhile doing this because the "calibrator" will be found of tremendous usefulness in all future testing with the oscilloscope where signals are connected directly to the vertical plates. The main battery shown consists of seven or more 45-volt "B" batteries, which will last a very long time because of the negligible drain in the circuit. The small 1.5-volt battery is used merely to light the 1.5-volt lamp to indicate that the switch is on. The voltmeter is a 0-300 or 0-500 volt DC voltmeter.

With the bottom vertical plate D3 grounded and the horizontal plates D1 and D2 connected to their amplifier terminals and synchronization of sweep and signal obtained as per the directions given above, connect the top vertical plate D4 to ground and note where the sweep line occurs. Mark this position on the screen with a china-marking pencil. Make the line 3 or 4 inches. This is the only mark to be made on the screen. Now, connect in the "calibrator" circuit and then touch the probe to some known DC voltage (say +10 volts). With the switch off, the sweep line will jump up to a position corresponding to a +10-volt deflection. Turn the "calibrator" switch on and turn up the potentiometer until the line returns to the marked line on the screen. If the sweep goes in the opposite direction, throw the reversing switch. Mark the correct position of the reversing switch plus, and the other position minus. The voltmeter on the "calibrator" will read very nearly 10 volts.

This, then, is the technique for measuring DC voltages by this new means. Connect the probe to the unknown voltage, turn on the switch, turn up the potentiometer until the sweep line returns to its zero position line (throw reversing switch if necessary) and then read the voltage directly on the voltmeter. What the "calibrator" does is interpose a counter or bucking voltage between the signal voltage and the deflecting plate, making the net voltage on the deflecting plate zero; the voltage necessary to do this is then indicated on the voltmeter. Although the voltage from the "calibrator" must necessarily be of opposite sign to that of the voltage being measured, the plus and minus markings on the reversing switch take this into account; and hence for any unknown voltage, the magnitude and polarity can be read off directly from the "calibrator."

Note also that voltages up to the limit of the battery voltage or the meter's full-scale (whichever is the limiting factor) can be measured by this means; even if we are measuring 250 volts (which would deflect the sweep line far off the screen), by bucking it out with 250 volts of opposite polarity from the "calibrator," we make the net voltage to the top deflecting plate zero. This is the technique in all cases.

The method will be particularly useful in looking at DC points where excessive hum or pick-up is suspected. (Small amplitudes of hum may not be detected because of limitations on oscilloscope sensitivity.) If the point is "clean," a clear, straight line will show on the screen (representing only DC on the top vertical plate); if there is some 60-cycle hum or high-fre-

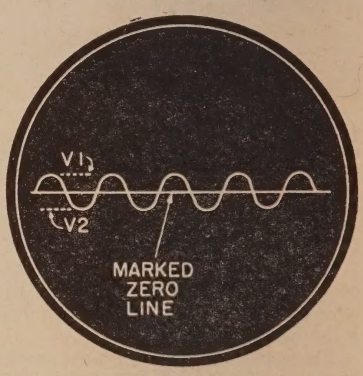
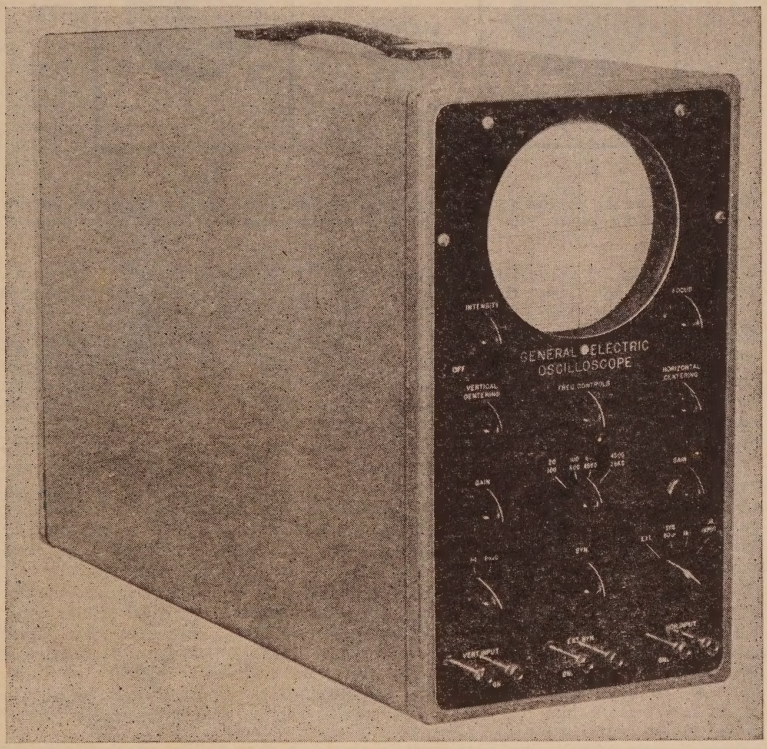


Fig. 5 The DC Voltage is indicated on calibrator voltmeter. The RMS value of the hum is equal to V2 minus V1 divided by 2.828.

quency pick-up on the point being observed, it will show as a wave of long or small ripples (depending on the frequency of the extraneous signal) whose amplitude peak-to-peak can easily be measured. The DC voltage at the point will be the "calibrator" voltage necessary to bring the pattern to a position where the marked line on the screen cuts through its center.

To measure any point on an AC voltage wave, connect the probe from the "calibrator" to the voltage point being observed. To synchronize the vertical voltage on the screen with the sweep, either use INTERNAL SYNC, or connect the signal (or a voltage which varies directly with the signal voltage; for example, if hum voltage is being measured, connect some 60-cycle line voltage to the EXTERNAL SYNC. terminal) to the EXTERNAL SYNC. terminal, and adjust coarse and fine frequency controls and sync amplitude control to obtain a steady pattern on the screen showing one or two complete cycles. Then, in the same manner as for DC voltages, turn up the calibration potentiometer until the point of the wave whose voltage is desired is exactly



The General Electric CRO 5-A Cathode Ray Oscilloscope. This is an excellent instrument for general servicing work. It uses a 5-inch tube.

coincident with the zero-line marked on the face of the screen. Then the voltage of the point will be read directly on the "calibrator's" voltmeter. If the RMS voltage of a pure sine wave is desired, measure the peak-to-peak voltage and divide by 2.828. This is the same as measuring the voltage between the peak and the half-way point, and multiplying by .707. See Fig. 5.

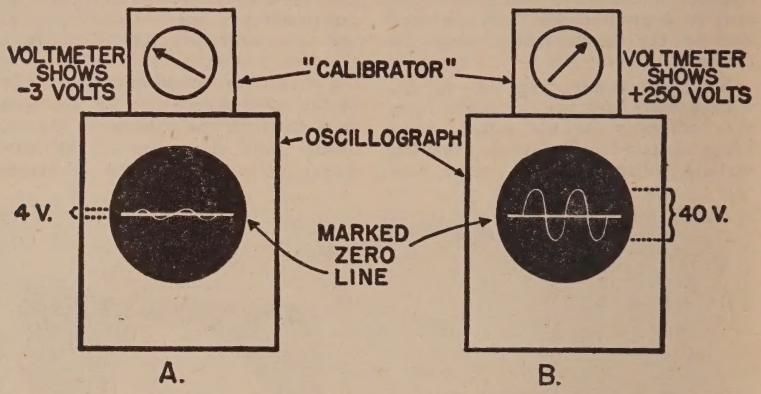


Fig. 6 A shows the pattern obtained at the input of the stage while B shows the pattern obtained at the output. This makes possible measurement of the gain of the stage.

Suppose we are checking the power amplifier tube in the audio of a radio receiver by inserting a small signal on the voltage amplifier tube ahead of the power tube. Connect the probe to the power tube's grid. Then suppose, after proper adjustment of sweep and synchronization controls, that a pattern like that of Fig. 6A is obtained: The calibrator's voltmeter shows —3 volts, with the top of the AC wave at —1 volt and the bottom at —5 volts. The AC signal then has a peak-to-peak value of 5 — 1 = 4 volts, or an RMS value of 4/2,828 = 1.41 volts. Now connect the probe to the plate of the power amplifier tube. Suppose a pattern like Fig. 6B is obtained, when centered by the calibrator potentiometer. The voltmeter reads +250 volts, the top of the wave is at +270 volts and the bottom at +230 volts. The AC voltage then has a peak-to-peak value of 270 — 230 = 40 volts, or an RMS value of 40/2,828 = 14.1 volts. From this knowledge we can now determine whether the audio is functioning properly or not: The power amplifier's grid bias is 13 volts, the B+ on the plate is + 250 volts, and the overall gain of the tube is 14.1/1.41 = 10.

For complex AC voltages which are known to be less than a few volts in amplitude and which, therefore, would show little or no deflection on the screen if connected to the plates directly, the following technique is to be used. The "calibrator" cannot be used here since it is useful only for signals sufficiently strong to cause a visual deflection when connected directly to the top plate. Strap D4 and D3 to their respective amplifier terminals (or in the case of some oscilloscopes, switch vertical plates to AMPLIFIER). Connect the small signal under observation to the input terminals of the vertical amplifier. Turn up the vertical gain until the signal can be seen comfortably (about 2 or 3 inches high on the screen). Mark the extreme positions of the wave on the screen with china-marking pencil. Keep the position of the

vertical gain potentiometer fixed (remember the number to which it is set). Then remove the signal and impress a variable 60-cycle voltage on the vertical amplifier, with gain set to same position as before. Increase the 60-cycle voltage until the pattern on the screen is exactly the same amplitude as that of the signal before. Measure the 60-cycle input with an ordinary AC voltmeter. Multiply this value by 2.828, and that will be the voltage between the two marked lines on the screen.

If the signal voltage is a complex wave-form, the voltages of all points on it can be estimated with reference to the two marked lines on the screen. If the signal voltage is a pure sine wave at some frequency other than 60 cycles, its voltage is exactly that measured on the voltmeter for 60 cycles. (It might be wondered why any pure sine-wave voltage could not be measured directly with a voltmeter. The answer is that most AC meters are accurate only at 60 cycles.) Care must be taken that a voltage of frequency higher than the maximum frequency in the flat pass-band of the vertical amplifier is not measured without consideration of the lower amplifier gain at that frequency than at 60 cycles.

Use as an Ammeter

The cathode-ray oscilloscope can be readily applied to the measurements of currents. Simply pass the current to be examined through a precision, non-inductive resistor and measure the voltage across the resistor by one of the means described above. The current will then be the voltage divided by the value of the resistance. Care must be taken to make the resistor as large as possible (to make the voltage across it as large as possible) without making it so large that it affects the circuit in which it is placed.

THE RADIO TRADING POST

(Continued from page 2)

FOR SALE—1938 Oldsmobile custom built 8 tube auto radio, A1 condition, $40. Stanor A battery pack, new condition, $40. ¼ h.p. 110 volt ac motor, $12. 1937 Ford custom built auto radio, A1, $30. Paul Capito, 637 W. 21 St., Erie, Pa.

WANTED—Radio experimental sections or booklets from the courses of DeForest or National Radio School, Los Angeles, Calif. E. P. Riffle, 462 Elm St., Ludlow, Kentucky.

WANTED—A 1280 Superior tube and set tester in good condition. Will pay cash. Nelson Kinman, Mt. Vernon, Ill.

FOR SALE—Speco signal tracer amplifier, A1 condition, $36. Want Rider's 8, 10, 11, and 12; also tubes 1LE3, 7A8, and 25B8. Royce Saxton's Radio Shop, Rt. 1, Pontiac, Ill.

FOR SALE—Closing out sale on U.T.C., Thordarson and Thermadon audio transformers at 55% off list price. Radio Communications Service, 4475 Myrtle St., San Diego 5, Calif.

FOR SALE—Radio chassis and speakers, power packs, power transformers. Send for list. Louis A. Goldstone, 1279 Sheridan Ave., Bronx 56, N. Y.

WANTED—P.M. speakers of 10 or 12 inches that will take 15 or 20 watts of audio, new or used in good shape. Have radio tubes, jig saws, power packs for battery radios, small amplifiers, mikes, small transmitters or what do you want. I have it. John Arnold, P.O. Box 84, Bluffs, Ill.

WANTED—Rider's manuals 1 to 5 abridged volumes 6 to 14 inclusive. Any and all volumes. State condition and price. Jack Marley, Bedford, Iowa.

FOR SALE—1946 GE tube tester, model TC-3, used about a month. Gernsback manuals, 1 through 7, also a couple of RCA manuals, all in good condition. Best offer takes it. Robert Kelley, Box 474, Rt. 1, E. Akron 5, Ohio.

FOR SALE—ATR inverter, model LIA, 6 volt input, 110 volts, 60 cycle output. Capacity 50 watts intermittent, 35 watts continuous. Very good condition. $7 or best offer. Frederick M. Keller, 28 Trull St., Somerville 45, Mass.

WANTED TO BUY—Volumes 2 and 5 of Rider's or similar servicemen's manuals. Give price and condition. Omaha's Radio Service, 1938 So. 16th St., Springfield, Ill.

FOR SALE OR TRADE—Alexander Hamilton Institutes "Modern Business Course." 24 volumes in excellent condition. Want signal generator. H. R. Ringold, 132 N. Doheny Dr., Beverly Hills, Calif.

WILL TRADE — National Radio Institute radio training correspondence course, for a communications receiver, any make or condition. Charles Kuhns, 3132 Broadway, San Diego 2, Calif.

WANTED — Hickok 210S or any jumbo V.O.M. Also jumbo tube tester of any make. Have cash. Also have a brand new Hickok 203 to trade. E. Sujak, 5321 W. 30th Place, Cicero, Ill.

FOR SALE OR TRADE—Radio books, oscilloscope, jewel meters, other radio items. Send for list. Want printing press 6x8 or larger, will pay cash or trade. O. R. Garrett, Rt. 6, Box 211A, Little Rock, Arkansas.

FOR SALE—Aluminum tubing ½" ODx4' length. Excellent for 2 meter beams. While they last, $.60 plus postage. G. Epstein, 112 Delaware Ave., Long Beach, N. Y.

FOR SALE—Stancor poly-pedance modulation transformer A3893, rated at 60 watts of audio, and will match any modulator tubes to any RF load. Am selling because I have 2 more besides this one. Price, my cost, $7.85 (net price) plus postage. Milt Kalashian, 2 Congress St., Newburyport, Mass.

FOR SALE—Brand new model 900 Silver "Vomax," complete with test leads and instruction book. Used but twice. $50 FOB. Also RCA Rider chanalyst in perfect condition, complete with all probes and instruction book, $95 FOB. W. Schofield, 346 Oak Grove Ave., Fall River, Mass.

WANTED—One AL4 radio tube for a German radio receiver (Graetz 48WS). Electrical Appliance and Radio Service, 204 Hope Ave., Passaic, N. J.

WANTED—Complete modulator less power supply, capable of modulating push pull 250ths. Give all details and price in first letter. Also model 321 Triplett O-500 milliammeter. C. L. Armstrong, Caledonia, N. Y.

WANTED—Power pack 110 volts ac to 6 volts dc, output 12 amps. Also a microscope. Please send details. Will sell or trade Confidence tube tester, model 36 and Supreme analyzer 333, rectifier is bad. Luther Cansler, Kings Mountain, North Carolina.

FOR SALE—35 mm sound films, short subjects, features, odd reels, and lengths of test sound track. For list write to W. L. Bourne, 870 Seward, Detroit 2, Mich.

FOR SALE—New improved R.M.E. model 45 receiver, Cal-o-matic two speed tuning system. Price $170. Greenen Radio Service, 518 Liberty St., Aurora, Ill.

FOR SALE — RCA 158 5" oscilloscope, $140. Hickok Crystal controlled signal generator, 19xd, $115. Both look new. Used very little. good working condition. 3 tube ac-dc phono amplifier with tubes, less PM speaker, $5.50. All sent prepaid. T. Wojciechowski, 2837 Fulton St., Brooklyn 7, N. Y.

FOR SALE—2 pairs new 6" Klein long-nose pliers, $2.25 each. 1 American Beauty 200 watt soldering iron, brand new, $7.40-$12 list. Above can be had C.O.D. if desired. M. A. Porter, 1709 N. Larrabee St., Chicago 14, Ill.

SELLING OUT — Two C-W transmitters, kilowatt input. Will sell parts. Parts in very good condition. Standard makes such as National Hammerlund, Thordarson. Antenna material, audio components. No junk. Send for list. Henry Anderson, P.O. Box 96, Pelican Rapids, Minn.

WANTED—To replace items taken in store robbery: 1 RCA record changer model VHR 212 with or without recording attachment, similar to series 098793; one Philco push button table model wood cabinet, 1940 or 41 manufacture; one small table combination single record player 4 or 5 tube chassis with or without top. These items to be in any reasonable condition. Mercury Radio Service, 217 W. 31st St., Chicago, Ill.

POSITION WANTED—As laboratory technician in electronics in New York City or vicinity. College graduate, BA in physics. Attending evening session for EE degree. 1½ years experience in electronics industry. Knowledge and applications of laboratory instruments. Five day week only. M. Horowitz, 1325 E. 19th St., Brooklyn 30, N. Y. Phone evenings, NI 5-6072.

FOR SALE—Superior volt-ohmmeter, model 670, new. Will sell for $26 postpaid. H. H. Eltz, Juniata, Neb.

WANTED—Rider's manual No. 2. Write and state condition and price. Challenger Radio, 3308 31st Ave., Long Island City 2, N. Y.

WANTED — Late model Motor Scooter. Must be in perfect condition. Prefer offers nearby New York. Also want 20-40 power telescope. Have for sale two small Klieg lights and floor type floodlight. G. Samkofsky, 527 Bedford Ave., Brooklyn, N. Y.

WANTED — Schematic drawings of one tube, two tubes, and other sizes using tubes 22, 2A4, 6SL7GT, 6DL7GT, 2A8, and 117L7GT. James A. Conley, 521 Buckingham St., Columbus 3, Ohio.

FOR SALE—Radio tubes. Send for list and prices. Standard Radio, 815 Central Ave., Box 543, Hamilton, Ohio.

FOR SALE—Plenty of radio tubes. Send for list and prices. Walter Rice Co., P.O. Box 543, Hamilton, Ohio.

WANTED—Communications set, good portable, binoculars, target pistol, sporting rifle, bench grinder, 12" hf speaker, all wave tuner, signal generator, condenser tester. Have over $500 worth of all kinds of equipment. Write for list. Earl E. King, 1431 E. Florence, Los Angeles 1, Calif.

WANTED—Short wave receiver of larger type, Hammarlund Silver Scott or similar, age, condition not important. Also large dynatic thousand fifteen hundred ohm or perm. magnetic, 12" to 15" Weston 772 or similar. Will exchange lists. Glenn Watt, Chanute, Kansas.

FOR SALE—One Silver Vomax, model 900 vacuum tube volt ohm DB MA meter and signal tracer. Only used two weeks. Perfect condition. Complete with instructions. Only $55. Will consider a trade. Larson's Radio Service, 608 Ninth Ave., Rock Falls, Ill.

WANTED—One or two 25B8GT tubes. Will pay cash or exchange for other tubes. J. Lipiner, 1032 Rutland Rd., Brooklyn 12, N. Y.

FOR SALE OR TRADE—Surplus 75 to 80 meter BC-223-A transmitter, phone C.W. Also PE-103 dynamotor, and BC-284 transmitter receiver. Want photo enlarger, good instruments or cash offer. K. H. Stello, 12026 Peoria St., Roscoe, Calif.

WANTED—Rider's manuals. Must be in good condition. Cash waiting. Roy Aberle, 161 Bush St., Brooklyn 31, N. Y.

WANTED—Magnetic wire recording equipment. Any condition. State your own price. Victor Kozma, 3104 Wilkinson Ave., New York 61, N. Y.

SELL OR TRADE—2½" GE meters NA 0-200, GE Decibel 0-100, GE Decibel 3 to 16, GE Nod. 0-1007. Write for information on other transmitting and receiving radio parts. Will exchange for photographic equipment and supplies. Edward Agastein, 5843 Christian St., Philadelphia 43, Pa.

FOR SALE OR SWAP— 1945 N.R.I. course complete with experimental kits for a fairly good tube tester. W. T. Graham, 66-24 Forest Ave., Brooklyn 27, N. Y.

FOR SALE—"Easy Built" radio, never been used, includes battery, tube, earphone, cabinet, and all parts to build. Will sell for $4.50 plus shipping charges. Henry Lee, 495 Third Ave., New York 16, New York.

FOR SALE — New Stanley plow, dado, fillelster and matching plane No. 46 with 9 cutter. Harold J. Buckley, 1337 Marlowe Ave., Indianapolis 2, Ind.

FOR SALE—I have a mailing list of 100,000 names covering every locality in the United States, Canada and Latin America. These names represent a high class clientele interested in fine merchandise. This is also a fine opportunity to advertise and establish new business. Write for further particulars, Only reputable firms need apply. G. Samkofsky, 527 Bedford Ave., Brooklyn, N. Y.

WANTED—Instruction book on operation of old model Supreme 400-A analyzer, 3 meter job, ac voltmeter, 0-150 dc mil. meter, 0-125 ma and 0-2½ amps, dc voltmeter 0-600 volts. Will pay for manual. Stanley F. Strusinski, 48 Victor St., Yonkers 2, N. Y.

FOR SALE — Brand new surplus radio equipment and parts. Send for list. Alfred C. Denson, 38 Park Pl., Rockville, Conn.

FOR SALE — Ghirardi's Radio Physics course in like-new condition, and unit course Junior Repairman Trainee-Radio by U. S. Army Signal Corps, both for $6 cash or stamps. Sidney Schlissel, Box 10, Kingsbridge Sta., New York 63, N. Y.

FOR SALE—Subscriptions to the following publications: Popular Mechanics, $2.50; Popular Science, $2.50; Science Illustrated, $3; Saturday Evening Post, $5; Life, $5.50. Get 3 or more subscriptions and keep 10%. J. Hamerling, 1562 Vyse Ave., New York 60, N. Y.

WANTED—Back issues of QST. Need issues between 1930 to 1945. Want in lot or single copies. All letters answered. Milton Kalashian, 2 Congress St., Newburyport, Mass.

FOR SALE — Weston tubechecker model 676, 105-125 volts, 60 cycles, 75 watts. Will check tubes having standard four, five, six, or seven prong base. Wiring diagram and instructions. $10. R. A. Urban, 5173 Highcrest Ave., Eagle Rock, Calif.

FOR SALE—A 3-line cushion mounted index faced rubber stamp and the same 3 lines on 500 gummed stickers for 70c and a new or used radio tube. Tube must test good when received. J. T. Cookson, Box OCD, Puxico, Mo.

WANTED—Power pack only for model 40 Atwater Kent radio. Pacific Sales Corp., 426 Larkin St., San Francisco 2, Calif.

WANTED—Instruction manual and sub assemblies or complete unit of receiver indicator ID-59, APA-11 or panaramic adapter AN-APA-10 as sold for surplus. Murray J. Douglas, Box 506, Concord, Calif.

TRADE—Triplett tube checker, model 2413, practically new in original carton, for a Philco or Motorola auto radio in good condition. Fred Cobin, 158 E. 7th St., New York, N. Y.

SELL OR SWAP—Tubes, receivers, transmitters, miniatures, acorns, and many other parts. Send for list. Want movie camera, projector, still camera or what have you? E. Schmitka, 1481 Shakespeare, Bronx 52, N. Y.

WANTED — Rider's manuals, volumes 1 through 5 especially. Will consider volumes 6 through 14 also. Must be in good condition and no pages missing. John T. Lipani, 157 Leverett St., Boston 14, Mass.

FOR SALE—Exact replacement of Grunow field coils at 40% off list price. Send for list of numbers. Laney-Keever Co., Monroe, N. C.

WANTED—BR151 Jensen bass reflex cabinet for 15" speaker, preferably unassembled, and in good shape and finish. Frank W. Jones, Gabbs, Nevada.

FOR SALE—16 mm Cine Kodak with F1.9, 25mm lens. In excellent condition, used but a few times, with solid leather carrying case. H. M. Manning, Rt. 1, Box 142A, Brunswick, Ga.

FOR SALE—Clough-Brengle graphoscope, model 127, complete with anti-capacity demodulator 147. 10 tubes, used very little, $75. Riddle Radio Service, 15 George St., Milford, N. H.

FOR SALE—Weston tube checker, counter type, 8" meter, model 672, spare sockets for modernizing, $40. Supreme checker, model 501, $25. Instruction charts for both. Triumph signal generator, model 110, ac only, 100kc, 30 mc, 400 cycle audio, $20. All in good condition. $80 takes all three. Seymour Radio Service, 118 West St., Newburgh, N. Y.

FOR SALE—1 PA set including 6 volt dc amplifier with 12" two speed turn table, 1 Shure crystal mike and table stand, and 1 12" PM speaker, $35.00 or $17.50 for amplifier. Vaughn E. Anderson, Rt. 12, Box 994, Portland 2, Ore.

WANTED—Chevrolet '39 dash mounting remote control, 10-1 ratio.. Also DCH-11 German tubes. Have for sale English reading German precision electrical meters, reasonable; pair German 6x24 binoculars, like new. Albert Hart, 4848 Linden Ave., Hammond, Ind.

WANTED—Instruction book for BC-375-E transmitter and BC-223-A transmitter. Will pay cash or trade. Have multimeter, ham-built, $15. Will trade both above transmitters for BC-348-Q receiver converted. K. H. Stello, 12026 Peoria St., Roscoe, Calif.

FOR SALE — Simpson model 220 Roto Ranger radio tube and set tester, in good condition. Make offer. Sam Wiseman, 114 N. Elmwood Ave., Buffalo 1, New York.

FOR SALE—Kodak Duo 620, f.3.5 lens, compur rapid to 1/500 sec., chrome trimming, everready case with filter and Kodak rangefinder. All like new. Highest offer in your first letter. Louis Fialkoff, 143-48 41 Ave., Flushing, Long Island.

FOR SALE—New Mercury II camera with yellow and red filter with attachments, ,sun shade and flash gun. Built in synchronizer and carrying case. 3 months old and used very little. Worth $103.65. How much will you give? Ben Cheskis, 2510 North 32nd St., Philadelphia 32, Pa.

FOR SALE—Voltohmyst, practically new, and many other parts including transformers, speaker, record changer, and used tubes. May have all for slightly more than the voltohmyst cost. $75 for all. Send for complete description. J. V. Freeman, 5025 Arch St., Philadelphia 39, Pa.

WANTED—German radio tube ECL-11. Will pay cash or swap. Also need German tubes ECH-11, EBF-11, EM-1-4-11 and AZ-11. All letters answered. Richard Cass, 18 Shornecliffe Rd., Newton 58, Mass.

FOR SALE—One Weston capacity meter, model 664, condition new, asking $25 for it. August Friel, 885 Cove Pl., Apt. 2A, Glen Hazel Hgts., Pittsburgh 7, Pa.

FOR SALE—Have new Hickok 203, $75 or any make Jumbo V.O.M. Also need plug analyzer. E. Sujak, 4209 Elston Ave., Chicago 18, Ill.

FOR SALE—Automatic .22 rifle, typewriter, tubes, and what not. Need amateur gear and Rider's manuals. Tubes shipped COD for reasonable deposit. Edward Howell, Sr., Rt. 2, Dillon, S. C.

FOR SALE—Slightly used 815 tubes, $2.25 each. Send for price lists of many other tubes purchased used surplus. Prompt refund if not satisfied. Eugene C. Hoelzle, 103 Woodmont Circle, Clinton, Tenn.

WANTED—Stancor 60P or similar rig. Have Ernemann f.2 10 cm camera, Carl Zeiss Jena 6.3, 110cm lens in Compur shutter for Graphic, chassis with 6V6 modulator, meter universal transformer and 400 well filtered power supply, all best parts. W. J. Kiewel, 520 N. Main, Crookston, Minn.

FOR SALE OR TRADE—Supreme 592 set tester, 593 tube tester and 594 analyzer in oak carrying case. Brand new, never been used. $75 or trade for good communications receiver. M. Salant, 6201 Bay Parkway, Brooklyn 4, N. Y.

WANTED — RCA channalyst converter, model 164 with coupling lead and test cable probe and instructions. Give price and condition in first letter. Will trade Gardiner code sender, model J. Ernest Deslauriers, 144 Tallman St., New Bedford, Mass.

FOR SALE—Weston model 773 tubechecker in good condition, $18. DuMont 3" model 164 in good condition, $50. Daidone All Electric, 862 So. Orange Ave., Newark, New Jersey.

FOR SALE OR SWAP—Have National short wave receiver, Rider's, Underwood typewriter, Eastman camera 3-A and other items. What have you? Send list. Glenn Watt, Chanute, Kans.

WANTED—Hickok signal generator, model 180 or 19X. COD only. Elton Radio Service, 725 Elton Ave., Bronx 55, N. Y.

FOR SALE—67" bow with a 25 lb. pull. Also five 26" arrows and a leather wrist guard. First good offer takes all. All letters answered. John Poirier, Harlowton, Montana.

FOR SALE—1A7GT tubes in sealed cartons at 30% off list price. Herb Levinson, 2422 Natrona St., Philadelphia 32, Pa.

WANTED—Electric radio service sign. Bernal C. Payne, 6974 Dartmouth Ave., University City 5, Mo.

FOR SALE—Underwood portable typewriter with case for $46.50. Complete stock radio parts and tubes, etc. Rifle, receivers, records, etc. Close out. Will sell entire lot tubes and parts for $700. which is less than net. Interested in mimeograph legal size machine and amateur gear. Edward Howell, Dillon, South Carolina.

SELL OR TRADE—I will give Hallicrafter SX-16 and cash or will pay all cash for SX-17 or SX-28. J. A. Lanze, 497 Portland Ave., Rochester 5, N. Y.

FOR SALE—Radio tubes 1D7G, 2A3, 2A5, 6SN7GT, 12SL7GT, VR53 (12K7 sub.). Star Radio Sales and Service, 2762 Woodmere, Detroit 9, Mich.

TRADE—Typewriter, Remington No. 10, office machine in good condition. Need a good portable typewriter. Write H. Galanty, 287 Conklin Ave., Hillside, N. J.

FOR SALE — National H.R.O. complete with 4 s.w. and 2 broadcast coils. New condition, cash price $150. Also have 3" voltmeters, precision portable multimeter. Harold T. Wills, Valatie, N. Y.

FOR SALE—Chassis with speakers, table model radios, and popular makes of radios. Send for price list and complete description. Louis A. Goldstone, 1279 Sheridan Ave., Bronx 56, N. Y.

FOR SALE—79 tubes, 12 Bullart tubes, manuals, signal generator, Triplett 666 V.O.M. tube tester, ATR "A" battery eliminator, condensers, controls, transformers, speakers. All for $250 or any part. Send for list. All goods C.O.D. Grant LaMaye, 548 E. 6th St., Erie, Pa.

FOR SALE—AC-DC V.O.M., no meter, $4. P.E. cell, unknown make, $1. F.B.X. xtal and holder, $2. 3 gang .000765 gear drive var. condenser, $.50. 2½ volt power transformers, 5 to 10 tubes, $.50 to $2. Anthony Pusateri, 1101 Fleming St., Coraopolis, Pa.

FOR SALE—For best offer, 1 Carter A450 genemotor, Dumont 164 oscilloscope, RCA oscilloscope, Supreme oscillator, Clough-Brengle ac oscillator, Weston 772 analyzer, condenser bridges, analyzers, meters, etc. Write for list. Henry's Radio Service, 10 Fountain St., Newport, R. I.

WANTED—Superior test equipment and what have you? Send complete information in first letter. All mail answered. R. Smith, 408 Wilson Ave., Brooklyn 21, New York.

WILL TRADE—2 meter transceiver relay operated by handset, uses HY615, 7F7, 6L6, HY75, 5U4G. Want Rider manuals 8 through 15. Transceiver worth $100. Velocity Sound Service, Box 288, Danbury, Conn.

FOR SALE OR TRADE—Supreme 599 combination set and tube tester in A-1 condition. Also Electronics magazines from 1943 to 1946. Also Hallicrafter receiver, S-41W. Want 35mm camera or what have you. Will answer all letters. Joseph Sarnese, 815 So. 7th St., Philadelphia, Pennsylvania.

When You Move or Change Your Address

Be sure to notify the Mailing Dept. of "The C-D Capacitor," Cornell-Dubilier Electric Corp., South Plainfield, New Jersey, giving the old as well as the new address, and do this at least four weeks in advance. The Post Office Department does not forward magazines unless you pay additional postage, and we cannot duplicate copies mailed to the old address. We ask your co-operation.

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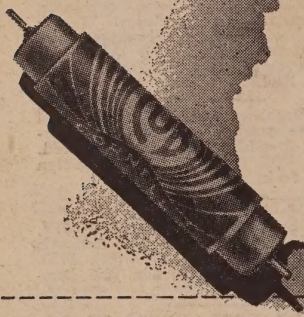

Letters like this, lauding the longevity and dependability of C-D capacitors, are welcome interludes in the business of producing top-quality components of radio and electrical equipment. Particularly those letters emphasizing unusual performance stories of C-D capacitors still on the job. We thank you Mr. Beck, and Mr. Brown, and Mr. Jones—all of you in fact for taking time out to point out C-D capacitor competence.

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